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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/957,468	09/20/2001	Mehrdad Nikoonahad	5589-02305	2660
35617	7590	02/23/2004	EXAMINER	
CONLEY ROSE, P.C. P.O. BOX 684908 AUSTIN, TX 78768			PHAM, HOA Q	
			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 02/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/957,468	NIKOONAHAD ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Hoa Q. Pham	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1413-1445, 1447-1450, 1583, 1688, 1751 and 1790 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1413-1445, 1447-1450, 1583, 1688, 1751 and 1790 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
     a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Terminal Disclaimer***

1. The terminal disclaimer filed on 10/31/03 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of copending applications (09/956,837; 09/956,852; 09/956,848; and 09/956,839) has been reviewed and is accepted. The terminal disclaimer has been recorded.
2. With respect to the amendment filed on 10/31/03, claims 1413-1445, 1447-1500, 1583, 1688, 1709, 1751 are pending for examination.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1413-1420, 1424, 1433, 1436-1438, 1443, 1450-1451, 1478-1482, 1487-1488, 1500, 1583, and 1688 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maris et al (U.S Pat. 5,748,318) in view of Tanimoto et al (U.S. Pat. 4,468,120).

Regarding claims 1413, 1450-1451, 1500, 1583, 1688, Maris et al discloses a sample stage (50,122) for supporting a sample (51), a measurement device (1) coupled to the stage which comprises an illumination system (10, 10', 10'', 10''', 40, 44) for directing light toward to surface of the sample, and a detection system (58, 60, 52, 54)

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coupled to the illumination system for detecting light propagating from the surface of the sample, wherein the measurement device generates one or more signals in response to the detected light, and a processor (66) coupled to the measurement device to determine a first property, a second property, and a third property, wherein the first property comprises a critical dimension (thickness) of the sample, the second property comprises a presence of defects and the third property comprises a thin film characteristic (stress, thermal, elastic, etc..) of the sample (see figures 1a-1c, 2, 16-18, and abstract). Maris et al does not explicitly teach that the defects comprise macro defects on a back side of the specimen; however, such a feature is known in the art as taught by Tanimoto et al. Tanimoto et al, from the same field of endeavor, discloses a foreign substance inspection apparatus in which the characteristic of defects on the front side of the specimen and the characteristic of macro defects on the back side of the specimen are determined from the one or more signals in response to the detected light (see figures 2 and 6 and column 8-9, lines 67-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the basic device of Maris et al to detect the defects present on the back side of the specimen as taught by Tanimoto et al if additional detection is desired.

Regarding claims 1414-1416, figures 16-18 and column 23, lines 6-16 teach that the stage is moved in X, Y, Z directions and rotated (tilted) in  $\theta$ -direction.

Regarding claim 1417, figures 1a, 1b, and 2 show that a single light source (12) is used.

Regarding claim 1418, figure 1c teaches the use of two light sources (12,13).

Regarding claim 1419, figure 6 teaches the use of a photo-detector (60) is used.

Regarding claims 1420 and 1437, figure 2 shows the use of detectors 58 and 60.

Regarding claim 1424, see column 27, line 53, for the principle of reflectometry.

Regarding claims 1433, 1436, see column 27, line 53 and column 25, line 35, for ellipsometer embodiment.

Regarding claim 1438, the optical elements, for example, elements 34, 34, 48, 52, and 54 are used for both first measurement device and second measurement device.

Regarding claim 1443, see abstract for the fourth property (roughness).

Regarding claims 1478, 1480, and 1481-1482, using processor to generate database is inherent in the system of Maris et al and also the system is used to detect a plurality of samples.

Regarding claims 1479, 1487, 1488, see column 20, lines 35-43, for calibration of the system.

5. Claims 1421-1423, 1425-1432, 1434-1435, 1439-1442, 1444, 1445, 1447-1449, 1452-1477, 1483-1486, 1489-1499, 1709 and 1751 rejected under 35 U.S.C. 103(a) as being unpatentable over Maris et al and Tanimoto et al as applied to claims 1413-1420, 1424, 1433, 1436-1438, 1443, 1450-1451, 1478-1482, 1487-1488, 1500, 1583, and 1688 above, and further in view of Moore (5,872,632) and Kuriyama et al (4,865,445).

Regarding claims 1421-1423, 1425-1432, 1434-1435, 1439, 1440, Maris et al teaches the use of ellipsometer or reflectometer as mentioned above and does not

explicitly teach the use of scatterometer, probe microscope, dark-field and/or bright-field device, etc., however, such devices are well known in the art. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in or replace the optical inspection system of Maris et al by devices above if additional defects (i.e. micro defects and macro defects) and/or characteristics of the inspected object are detected. In addition, using such the dark-field and/or bright-field device, etc... would provide increased sensitive measurements of the surface of the specimen.

Regarding claims 1441 and 1442, Maris et al, column 8, lines 38-42, teaches that the thin film to be inspected may be an overlying of oxide, polymer or metal. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the basic device of Maris et al to detect the defects of a copper film because the device would function in the same manner.

Regarding claims 1444-1445 and 1447-1449, 1452-1477, and 1489-1493, Maris et al teaches that the sample comprises a thin film (84) disposed on the substrate (semiconductor wafer)(80) or SOI wafer. Maris et al does not explicitly teach that inspection system is coupled to process tool or processing chamber. However, such a feature is known in the art as taught by Moore. Moore, from the same field of endeavor, teaches that the inspection station (210) is coupled to the processing chamber (105) or reaction chambers (110,120,130) which are used for etching, depositing, annealing, etc...) (see figure 2, column 1, lines 11-17). It would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange the inspection

system of Maris et al in a cluster tool as taught by Moore. The rationale for this modification would have arisen from the fact that including the inspection system in the cluster tool would save time required to move the substrate and take the substrate to a remote instrument as suggested by Moore (column 2, lines 1-7).

Regarding claims 1483-1486, 1495-1496, Kuriyama et al teaches the use of a plurality of measurement devices (100, 200) for measuring different properties of the object (see figure 3). Those of ordinary skill in the art at the time the invention was made to include in Maris et al a plurality of measurement devices as taught by Kuriyama if additional properties of the object are measured.

Regarding claims 1497-1499, 1709 and 1751, Maris et al teaches the use of computer to control and process the signals and discusses the use of local processors (column 23, lines 15-16 and 26).

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 1413-1445, 1447-1450, 1583, 1688, 1790, and 1751 have been considered but are moot in view of the new ground(s) of rejection.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Clark et al (6,198,529), Kinney et al (5,909,276) and Fairley et al (6,288,780) disclose a wafer inspection system.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoa Q. Pham whose telephone number is (571) 272-2426. The examiner can normally be reached on 6:30 AM to 5 PM, Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read 'H. Pham', is positioned above the printed name and title.

Hoa Q. Pham  
Primary Examiner  
Art Unit 2877

HP  
January 29, 2004